AMERICAN FARMER.

RURAL ECONOMY, INTERNAL IMPROVEMENTS, PRICE CURRENT.

" *O fortunatos nimium sua si bona norint*
" *Agricolas.*" . . . . . VIRG.

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AGRICULTURE.

From the Bath and West of England Society Papers, Vol. X.

AN ESSAY ON MANURES,

BY ARTHUR YOUNG, ESQ.

To whom was assigned the reward of the first BEDFORDEAN MEDAL *voted by the Bath and West of England Society.* 1804, *agreeably to the following advertisement :*

" The BEDFORDEAN GOLD MEDAL will be presented to the author, who, at or before the first meetiug in November 1804, shall produce to the Society the best essay, founded on practical experience, on the nature and properties of manures, and the mode of preparing and applying them to various soils. In which essay shall be pointed out the cheapest manner of collecting and preparing the different kinds of manures, and the state, season, and quantity in which they should be applied."

Intention of the Premium.

It is apprehended that the Society expect something in the nature of a general Treatise on Manures, by addressing the advertisement *to authors.* Had they meant the mere register of experiments made by the candidates, it is presumed they would, as on other occasions, have said merely *the person who shall make, or register and produce,* &c. ; and they would probably have allotted a longer period for such experiments than the course of a single summer.—The very important words, however, of *practical experience,* point out the nature of the authority they require ; that no essay will meet their approbation which has theory for its basis ; the foundation must be fact, and experience, whencesoever drawn.

Division of the subject.

The words of the requisition demand that attention should be paid to the following circumstances, which may also be thus arranged :

1. The nature of manures
2. Their properties.
3. Collecting.
4. Preparation.
5. State in which applied.
6. The application.
7. The season when applied.
8. The quantity.
9. On what soils.

In classing the various bodies which may be applied as manures, it may be proper to divide them into,

1. Such as are dug or made on a farm ; and,
2. Such as are usually purchased.

The first comprehend,

1. Marle.
2. Chalk.
3. Lime-stone and lime.
4. Clay loams and sand.
5. Burnt clay.
6. The ashes of paring and burning.
7. Yard dung.
8. The sheep-fold.
9. Pigeon's dung.
10. Pond and river mud
11. Seed weeds.
12. Pond and river weeds.
13. Hemp and flax water.
14. Burnt vegetables.
15. Green crops ploughed in.

Under the second head are included,

Animal Manures.

1. Night soil.
2. Bones.
3. Sheep's trotters.
4. Hair,
5. Feathers.
6. Fish.
7. Greaves.
8. Woollen rags.
9. Currier's shavings.
10. Horn shavings.

Vegetable Manures.

1. Wood-ashes.
2. Peat-ashes.
3. Coal-ashes.
4. Soot.
5. Peat-dust.
6. Pot-ash waste.
7. Sugar baker's waste.
8. Tanner's bark.
9. Malt-dust.
10. Rape cake.

Fossil Manures.

1. Salt.
2. Gypsum.

To which may be added some remarks on composts, and on the food of plants.

PART I.

Of the Manures made or dug on the Farm.

CHAPTER I.

Of Marle.

Marles the most common in England are clay marle, stone marle, and shell marle. They are by some distinguished by their colours white, red, blue, black, &c. but colours deserve no other attention in these bodies than as indicative of iron.

§. 1.—*The Nature of Marle.*

The Bath and West of England Society is a body much too enlightened to use any term in an advertisement, the purport of which has not been well considered. When, therefore, the expression *nature* is admitted, as distinct from *properties,* they seem to require some intelligence on the component parts of the substances used as manures ; alluding probably, by the term here adopted, to the *passive* qualities of bodies, as the *active* ones are supposed to be discriminated under the word properties.

Marle is a fossil substance, usually composed of sand, clay, and calcareous earth ; the red and black marles have a small quantity of iron. I have analized red marle from Cheshire, which had seventeen grains in one thousand ; and there are very few specimens, even of the whitest marle, in which prussiat of pot-ash will not give some note of the presence of that mineral. The quantity of calcareous earth varies extremely, from 25 to 80 per cent. Mr. Kirwan remarks the impropriety of not calling a body chalk which contains more than 80.—One of the best clay marles contained 40 per cent. of calcareous earth, 50 of clay, and 8 to 10 of sand, with clear signs of some iron.

Marle falls in pure water ;—but all examination by water is uncertain, if the water itself be not first analyzed. It falls also by exposition to the atmosphere. Of its three constituent parts, calcareous earth is composed of about one-third* part carbonic acid, which is driven off by heat. The clay contains generally a small portion of iron, a little volatile alkali,† and some sulphuric acid ; and even when deprived of all organic matter, yields hydrogen gas. The sand, if *clean,* contains none of these substances. Phosphorus may be gained from all calcareous earths.

§. 2.—*The Properties of Marle.*

The property that renders this manure particularly valuable, is the calcareous earth (carbonate of lime) it contains ; and to every enlightened farmer it must be sufficiently evident, that as all fossil manures are intended to correct or improve the texture of the soil, its constituent parts must be known, before any application can rationally be made of this or any other similar manure. A fair specimen of each division of soil should be selected; I do not say field, because the line of fences may not be the line of change in quality. In this selection every material circumstance of elevation, slope, shelter, &c. should be had in contemplation, and the usual quantity of rain that falls in the district. The specimen should be taken from very many spots, that the average may be the fairer. The authors are numerous who direct how soils are to be analyzed. The grand object with relation to marling is to discover the proportion of calcareous earth already in the land ; and it is easy, while this is doing, to find the proportions of sand and clay ; which three constituents form the texture of soil.

It is extremely difficult to discover, from the knowledge at present possessed by the public, what ought to be the quantity of calcareous earth in a soil. The best specimen analyzed by Giobret, had 6 per cent. ; by Bergman, 30 per cent. ; by Dr. Fordyce, 2 per cent. ; a rich soil, quoted by Mr. Davy, in his lecture at the Royal Institution, 11 per cent. This is an enquiry, concerning which I have made many experiments, and on soils of the most extraordinary fertility. In one, the proportion was equal to 9 per cent. ; in another, 20 per cent. ; another, 3 per cent. ; and in a specimen of famous land, which I procured from Flanders, 17 per cent. But the circumstance which much perplexes the enquiry is, that many poor soils pos-

* By Mr. Kirwan, a third ; by Bishop Watson, 9 in 20 ; and by other authors, with some small variations. Extreme accuracy is desirable in merely philosophical experiments, but useless in agriculture.

† Boyle, Kirwan, &c.

sess the same or nearly the same proportions, as these most fertile ones. To attain the truth in so important a point, induced me to repeat many trials, and to compare every circumstance; and I am disposed to conclude, that the necessity of there being a large proportion of calcareous earth in a soil depends on the deficiency of organic matter; of that organic matter which is convertible into hydrogen gas. If the farmer find, by experiment, that his soil has but a small quantity of organic matter, or knows by his practice that it is poor, and not worth more than 10s 15s or 20s. an acre, he may then conclude that there ought to be 20 per cent. of calcareous earth in it; but if, on the contrary, it abound with organic matter, and be worth in practice a much larger rent, in that case his marle cart will not be called for, tho' there be but 5 per cent. or even less, of calcareous matter. Another motive for marling, which also concerns the texture of the soil, is that of giving tenacity and firmness; for this purpose clay marles are better than any other. One property of the calcareous earth which is in marle, is that of correcting acidity. Some soils abound with acid particles, which are prejudicial; these are neutralized, and rendered, if not beneficial, at least harmless.

That it is a property of the calcereous earth to be taken up by plants, there is a great reason to believe from many experiments. The earth of vegetables is for the greatest part calcareous.* Water dissolves $\frac{1}{610}$ parts of its weight of calcareous earth; and we find in this $\frac{39}{100}$ of carbonic acid, and thus inpregnated, it dissolves $\frac{1}{130}$ of its weight of carbonate of lime.† The vegetable acids have a great affinity with calcareous earth.‡ In this respect, however, the quantity demanded is very small; for Lord Dundonald asserts, that all the calcareous earth to be obtained from an acre of most crops will not exceed 80 pounds. Should the soil be deficient in calcareous earth, the application of marle must with this view be important.

In regard to sand and clay, they both enter as component parts of vegetables; but they abound in all soils sufficiently for this purpose. A material advantage attending the use of calcareous manures results from their assisting the putrefaction of animal and vegetable bodies.‖ The particles, waste, and remnants of vegetables unconsumed, which all lands abound with, are thus assisted in the decomposition, and prepared for becoming the food of fresh vegetables. Dung also, when applied after such a manuring, acts sooner, and with greater effect. Of composts I shall speak hereafter.

§. 3.—*Collecting.*

The common way of procuring marle is by diging. It should however be mentioned, that it is dredged up from the beds of some rivers, particularly the Shannon.

The white shell marle, and white species of sin marly specifick levity, (probably the *agaricus mineralis*) are both found under bogs, and also at the bottom of lakes.

* Kirwan. † Burgman. ‡ Senebier.
‖ Macbride, Pringle, Lavoisier, &c.

No person, whose land wants marle where it is not generally known to exist, should be satisfied without a most careful examination by boreing. A borer for twenty feet depth does not cost above 3l. (for eighty feet not more than 20 guineas) and it is used without difficulty by any common workman, after a little attention in explaining it. The bottoms of lakes and rivers should also be examined.

§. 4.—*Preparation of Marle.*

None.

§. 5.—*State in which applied.*

Whatever benefit may result from exposition to the atmosphere, it must be attained after spreading; the quantity is too large, and carriage too expensive to permit any additional operations. If dredged from the bottom of lakes or rivers, the heaps should be left from six to twelve months.

§. 6.—*The application.*

Under this head must be considered.

1. Carting.
2. For what crop.
3. Depth of tillage.

The expense of carriage is every where so great for bulky manures, that every means should be used for lessening it. The most important improvement in this respect is that of substituting one-horse carts instead of the larger ones in more common use. The superiority in every respect of expense, viz. of vehicle, number of horses, weight drawn, drivers, (proportioned to weight, &c.) has been so well ascertained, that the point should be considered as proved and done with.

The crop for or on which marle is first carried, must be either on lays or layers, as they are called, or fallow. The former is much the best, as the farmer has the power of leaving it exposed six, twelve, or eighteen months; the longer the more advantageous.* The successive changes of the atmosphere moulder it down; and the roots of the grass combine it with the surface, where it is preserved much longer than if stirred immediately by the tillage of a fallow. This remark applies proportionally to the looseness of the soil on which it is spread. On sandy soils it is essential to good management. But I have in my own practice found, by the use of some thousands of loads, that the above position is strongly applicable to wet and heavy loams, as well as to sandy loams, both of which have been greatly improved by clay marles. Let it be remembered, that all fossil manures have a constant tendency to *sink*, so that in a course of years they will subside below the action of the plough; and this takes place pretty much in proportion to the number of ploughings which the land has received.

Thirdly, respecting the depth of tillage. The most experienced farmers are apprehensive of turning the marle in too deep. The most approved practice is to plough the layer shallow for peas. There is but one objection to turnips, and that is giving so much tillage so early after the improvement. Avoid potatoes, for I have found them mischievous in this period of marled land.

* See two very valuable practical papers on this subject, by Mr. Macro, (Annals of Agriculture;) and by Mr. Rodwell, (Communication to the Board of Agriculture.)

§. 7.—*The Season.*

This is soon dispatched; for the business of marling is usually done on such a scale as to preclude choice; it must be performed when the teams have leisure for the work. And if these are bought for the purpose, in order to finish a whole farm as fast as possible, that the farmer may reap the longer benefit, they are generally kept at work the whole year through; but if the business is on a smaller scale, so that the farmer may have his choice, on all wet and heavy soils it should be summer work, and on dry ones it may be as well performed in the winter.

§. 8.—*The Quantity.*

This is an object of extreme importance; for I have known very ill effects from giving over doses of marle, and in some cases the fact is curious. In the earlier stages of the improvement in Norfolk, and even to the present time, some farmers, from experiencing the evil of looseness and a want of texture in their poor sands, marled at the rate of from one hundred and twenty to one hundred and fifty cubical yards per acre; and the consequence was what they term *setting*. The firmness was produced, but being too much at the expense of friability, a necessary property in sand, the productiveness of the fields was *damaged* for twenty years; so that at present upon sands of weak fertility, from sixty to eighty cubical yards, or 40 to 60 large loads, are a common quantity, and found to answer well. If rather underdone, they find it better to give a *second* dose than more at once. This prejudice from overmarling is remarkable; because, after it is done, the analysis of the surface will indicate no improper proportions, nor any which are not found on very rich soils. I conceive it is for want of the additament being homogenous, and well assimilated with the sand, as in soils of a natural texture it is rather a mixture than an incorporation. But *why* this should continue for so many years, it is very difficult to account for.—When the evil is discovered, the management should be varied. Seeds should not occur so often, nor be left so long as usual, and tillage more freely exerted; this will accelerate the subsidence, and the marle will be more beneficial in such a case below than on the surface. The quantity to be spread on poor, loose, wet loams is much more considerable than on loose sands; I have not known, in this case, too great a dose given; though I have spread as far as one hundred cubical yards per acre, and have known much more. The marle in this case assimilates more easily. On loose peat bogs, and on moors, the greater the quantity the greater the improvement. In all cases where the object is to give calcareous earth, the quantity necessary is much less than when the intention is to consolidate the texture of the soil. In East-Norfolk, where the texture approaches to perfection, they lay on so little as

ten or twelve to twenty tons. In Somersetshire, thirty loads an acre, raised by a shaft, has improved from 3s. 6d. to 31s. 6d. an acre.

§. 9.—*The Soil.*

The defect of a soil must be understood, before a wise farmer will put himself to the expense of marling. The experience of every day will inform him if his land want tenacity and consolidation; but the want of an addition of calcareous earth, as a food of plants, can be discovered only by analysis. There are other circumstances which demand attention. If the *chrysantheum segetum*, the *polygonum pensylvanicum*, and the *rumex acetocella* abound, the experienced farmer will pronounce that the land wants marling; and turnips producing deformed strings of roots, without swelling into the proper gobular form, or being extremely subject to the well known distemper of the *anbury*, both afford a similar proof of too much looseness of texture, and suggest the consolidation of clay marle. Those evils vanish after this operation. The *erica vulgaris*, or common heath or ling, abounding in land, is generally a proof of an acid soil; and all peat soils are found, on analysis, to contain a considerable quantity* of the gallic acid, or tanning principle.† Some have been rendered quite steril by acids.‡ "I was led," says Mr. Wight, "to see a stratum of moss impregnated with vitriolic acid so abundantly, that out of 4 lbs. of the moss one pound of green vitriol was extracted."§ There is a bog in Bedfordshire, in which sulphat of iron abounds in a degree almost equally extraordinary; but it has been converted into one of the finest watered meadows in England by his grace the Duke of Bedford. Wherever such soils are found, the application of marle, by reason of its calcareous earth, is sure to have great effect. Instances are too numerous to quote; the acid is converted into sulphat of lime, or gypsum, and consequently harmless, if not beneficial. Upon wet but loose loams, which are found when manured to be more productive of straw than corn, I have found clay marle to be a cure, and attended with unquestionable profit. Another quality of these loams is that of being uncommonly pestered with the red worm; and it is a singlar quality of marle to lessen this evil considerably; whatever gives them a firmer texture, has a tendency to this effect.

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CHAPTER II.

Of Chalk.

The difference between marle and chalk is not so great as to demand a repetition of sections. It will be sufficient to point out the circumstances in which there is a variation.—Chalk is a substance in which there is a greater proportion of calcareous earth than in marle, and at the same time it is comparatively harder; for though many sorts of chalk will, when exposed to the atmosphere, moulder down into powder, yet others require some years to effect such a reduction; and though we do meet with soft chalks, they are not common. Many specimens of this fossil have been analized, that yield above 90 per cent. of calcareous earth; and Mr. Marshall registers one that contained 98 per cent. The properties are nearly similar to those of marle. The circumstances in which they vary most are the calcination of this body for making lime, and the power it has of rendering tenacious clay more dry and friable: whereas stone marle alone has not the same effect, and is inferior to the hardest sorts of chalk. It is also more common to chalk grass lands than to marle them; and it works a capital improvement on low, coarse, sour meadows, rendering them firmer, and improving the sweetness of the herbage.

In raising chalk, there is one distinction from marle, (unless of great solidity) which is that of sinking shafts for it. This is the general practice of Hertfordshire. The chalk drawers travel in gangs, chamber it all around, leaving columns to support the incumbent earth, and draw it up in buckets. They will wheel it on to the land for 8d. the load of twenty-four bushels, to the distance of twenty poles from the shaft. This is a much more convenient and a cheaper way than opening marle pits: and it saves, on strong land, the mischief of poaching by the draft of horses.

Relative to preparation, state, application, and season, the remarks on marle may be referred to.

In regard to quantity, it is generally used in much smaller quantities per acre than marle. In Essex, where it is brought by sea from the Kentish coast, from five to eight waggon-loads are attended with more remarkable effect than even dung itself, if the land has not been chalked before. More than forty cubical yards an acre are rarely spread.

In the soils upon which chalk is used, there is a considerable variation from the practice relative to marle. The most remarkable effects which I have seen attending it have been upon good sound loams, worth from 15s. to 20s. an acre. Six or seven waggon-loads per acre are seen immediately in the crops, and to an inch. Six miles from Malden in Essex, where it is spread at the expense of about 20s. per waggon-load, the same result has been observed: and also at Enfield; the soils have not been analized, but it may be supposed that they are, though valuable, deficient in calcareous earth. It is remarked, that chalk presently gives the land a reddish colour, so that the part of a fallow which has been chalked, will, from that tinge, be discernible at a distance. A very singular circumstance observed in Essex is, its being an enemy to what their farmers call grazing, or running to turf. A field, which before chalking will run of itself to a fine head of white clover, does so no longer after chalking. The chalk is not soft, but rather hard. The sharpest frosts leave many lumps unbroken, which must be done with pickaxes; and the hard bits, which break to a clear white, are better that those which crumble between the fingers. This attaches to the texture of the soil, which is rather too stiff for turnips.

Soils abounding with spontaneous wild sorrel are well known to be highly improveable by chalk; and Lord Dundonald has a remark which applies to the fact: "The oxalic acid, or acid of sorrel, is found in the plant of the same name, combined with the vegetable alkali.—Much of the oxalat of lime will be formed by adding calcareous matter to the ground abounding with plants of sorrel, or other vegetables containing the sorreline acid. From the insolubility of oxalat of lime, it is not probable that it can contribute, *per se*, to the food of plants. It cannot be decomposed by alkalis on superior affinity, but it may by the vitriolic acid, in which case gypsum will be formed; and the acid thus disengaged will combine with fixed or volatile alkaline salts, or magnesia; these are soluble, and promote vegetation in a high degree."

Chalk is used successfully on all soils upon which marle is found to answer. It is not a general favorite in Norfolk for poor sand, or even middling ones; but some farmers of considerable note for accuracy of observation, have of late used very hard chalk, and with great success.

On all moors, peat bogs, and peat fens, every species of calcareous earth is applied with singular effect: chalk is to the full as valuable, or more so, than marle, as it contains more calcaearth.

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CHAPTER III

Of Lime

After the volumes which have been written upon this Manure, it ought to have been well understood in every variation, and in every application; but so much theory has been mixed with facts, that the contradictions are numerous and perplexing. The only chance of attaining plain and simple truths will be to reject all opinions, and examine the language of experiment alone.

§. 1.—*The nature of Lime.*

All hard calcareous substances of whatever colours, or other quality, will burn into lime; marbles of various sorts, limestone, chalk, spar, &c. The operation of fire expels from these substances certain portions of water and carbonic acid, leaving pure or nearly pure calcareous earth: which, while deprived of its acid, has certain caustic and other qualities. It has a strong power of re-absorbing moisture, and carbonic acid, when exposed to the atmosphere; and from all other bodies with which it comes in contact; but it cannot unite with the air unless it is previously moistened: 100 parts of lime absorb about 28 of water. To regain its full portion of air from the atmosphere, it requires a year or more; but not if spread purposely.* One thousand bushels per acre have been spread in Derbyshire. In the proportion of twenty cwt. of lime gaining five cwt from the atmosphere, that quantity would gain above thirty tons from it.† Of how great consequence is it to discover the effect of carbonic acid on vegetation?

Relative to the other constituent parts of

* Essays Physical and Literary, vol. ii. p. 249.
† Headrick.
‡ Darluc Hist. Nat. de Prov. vol. ii. p. 127.
§ Husbandry in Scotland, vol. iv. p. 415.

* Kirwin. † Bishop Watson.

lime, there is yet in the chemical world some uncertainty. Mr. Boyle says expressively, that he has found sulphureous particles in lime.—There is no doubt of iron being contained in many lime-stones. Dr. Priestly conjectures, that some of (what he calls) the phlogiston of the fuel adheres to the lime. Lavoisier declares, that quick-lime contains a great quantity of the matter of pure fire. He notes also some slight traces of volatile akali, if burnt in a close vessel. It is soluble in about 700 parts of water. The observation of Guyton de Morveau, that lime is composed of carbon, nitrogen, and hydrogen, is not sufficiently cleared up; it contains phosphorus.*

These remarks are applicable to the purer limes; others less pure contain a portion of calcined sand and clay. But whatever is peculiar to lime depends on the calcareous earth.—There is one material variation in the nature of lime, which arises from the stone having a mixture of magnesia it. Mr. Tennant has explained this fully in the Philosophical Transactions, by comparing the lime-stone of Doncaster with part of Ferrybridge: the latter is very pure, and the former contains three parts of pure calcareous earth, and two parts of Magnesia. Bredon lime in Derbyshire is of the same quality. Magnesian lime-stone is easily known by the slowness with which it dissolves in acids; the color is also a means, if not absolutely of detecting, at least of suspecting its presence, for no lime stone that breaks blue contains it; the hue is generally brown, or of a fawn color. It has been found from many observations to be mischievous in agriculture, as calcined magnesia is a poison to plants.

§. 2.—*The Properties of Lime.*

These are evident to any person who considers the constituent parts. By its calcareous earth in a mild state, that is, when all or much of its carbonic acid is re-absorbed, it has all the properties of chalk or marle, so far as the calcareous quality is concerned; it yields that substance to plants, if wanted; it neutralizes acid salts, and consequently will act powerfully on all peat soils, whether bogs, fens, or moors: but it will not give tenacity to sand-like marle, nor the friability to clay which chalk will effect.—When laid on in its caustic state, and especially in large quantities, it destroys the spontaneous growth of those and such like soils; for though it resists putrefaction, (which is no good quality) yet it resolves organic substances into a mucus † The truth of this observation is visible on limed moors; and this is a very valuable quality, when the spontaneous growth is a nuisance, as it generally is on those soils. It strongly attracts inflammable substances, such as sulphur and resins;‡ and Dr. Darwin ingeniously supposes, that by its union with carbon it renders that substance soluble in water, forming a *hepar carbonis*. But circumstances which demand reiterated experiments, and are in truth extremely curious, can be no more than hinted at It is in a state, when slacked, of such extraordinary divisibility, that it is capable of much more intimate combination with other substances than either marle or chalk.

* Darwin. † Kirwan. ‡ Delaval.

In proportion as the carbonic acid is beneficial to vegetation, must be in a great measure the importance of lime. But here some obscurity attends the subject; for neither in this respect, nor with any view to its phosphorus, fire, volatile alkali, or any other secondary constituent part, is it to be considered as *directly* yielding the food of plants. A thousand practical observations prove, that upon very poor soils it has no effect; and that the benefit derived from it is in proportion to the undecomposed vegetables in the land.

§. 3.—*Collecting; Preparation.*

Lime-stone exists in many districts, unknown to the farmer: in this respect it varies from chalk. In the South-Eastern counties of the kingdom, the basis of which is chalk, a farmer may be almost sure that chalk is under him, though perhaps at a depth unprofitable to work; but lime-stone is more various, and found in more insulated situations. The common test is by pouring a powerful acid on the stone; yet this test is not practically correct; for some specimens which effervesced with nitric and muriatic acids, would not burn to lime with any heat that could be applied: the cause seemed to be a great mixture of micacious particles.

Calcination is the preparation of lime; an operation pretty well known, wherever it is commonly found. Kilns are of various constructions, and of very different degrees of merit. To describe them would swell these papers to too great a bulk: the most profitable are the perpetual draw-kilns, egg-shaped, with a short neck, and a roof over the mouth in the shape of an extinguisher, open at the point; this gives a draft. Effective burning is a point of much consequence; as the causticity of the lime depends on the entire expulsion of the carbonic acid, known instantly by its levity in the hand. It is burnt with wood in various kilns; and with peat, culm, or small-coal, in draw-kilns.

§ 4.—*State; Application.*

The most material distinction in the application of lime is, that of spreading it fresh in its most caustic state; or keeping it till slacked, and till it has re-absorbed more or less of its carbonic acid. The common practice of various districts has ascertained this point very satisfactorily, and in perfect conformity with chymical principles.

Upon all soils in a state of nature, and greatly abounding with undecayed vegetables which are required to be speedily destroyed, it should be and is spread *hot from the kiln* as it is termed, which is in its most caustic state. But in other cases, by the general practice, and consistently with principles, lime is slacked before it is spread. Upon waste lands the causticity has an evident and necessary effect; but not upon cultivated soils, where the antiseptic quality of the substance, while deprived of its carbonic acid, would tend to prejudice rather than improvement. When the lime has regained its gas, it rather promotes putrefaction; and if carbonic acid be really *a food of plants*, the acquisition of so large a quantity in the soil cannot be immaterial.

A truly practical husbandman of great experience gives directions for the application which merit attention. "Let the whole quantity of lime, intended to be used on any given field of moderate size, be laid into one heap, where water can be had most conveniently. Let it be there thoroughly slackened; and immediately after it is cold, which it will be in a day or two, fill the carts, and spread the lime out of them with shovels equally over the surface.—The more common method of laying it down in small heaps over the whole field, to slack by rain, is very erroneous: it is liable to get too much rain, which, in place of reducing it into a fine powder, converts it into a running mortar, in which state it will neither spread equally, nor mix with the soil."* And Mr. Wight remarks, for the same reason, that both the soil and the lime should be quite dry at the time of spreading. In Dumfrieshire, quick-lime being compared with that which had lain in a heap for several years, in consequence of a law-suit, the latter did much more good than the former.†

§. 5.—*Season.*

Where improvements are carrying on upon a large scale, and draw-kilns are kept at work through the year, the choice of season becomes of secondary importance; but liming should otherwise no more go on in winter than building. It may be continued from March to October: but summer is the best season It should be spread on a layer one full year before ploughing, that it may have time, as Mr. Craike observes, to fix itself firmly on the sward. If ploughed too soon, it falls to the bottom of the furrow, and will be the sooner lost; for it continually sinks. The same observation has been made in Perthshire; they do not plough till it has taken a firm *gripe* of the ground ‡ The same was the result in Lancashire. Three years before breaking up a ley, part was limed with three hundred bushels an acre; and another part, only one year before; the former produced oats 10 for 1 of the seed, the latter 6 for 1.§

§. 6.—*Quantity.*

It would be easy to collect many authorities, and even respectable ones, which specify the quantities that have been used successfully; but the advantage would not be considerable, unless there was a clear reference to other circumstances. In the practice of the greatest and most able cultivators, soils are rarely analized carefully by a chymical operation; and without this our information can only be had by halves. The want of chymical examination going hand in hand with farming practice has left agriculture, as a science, but in its infancy. The largest quantities that have been spread, and with entire propriety, have been on bogs and peat moors, and on mountains. The Bishop of Landaff speaks of one thousand bushels per acre on moors in Derbyshire with great suc-

* Mr. Craike, of Arbigland.—Transf. Dumf. Soc. No. II. p. 34.

† Report.

‡ Statistical Account of Scotland, vol. xix. p. 436.

§ Dr. Campbells communication to the Board of Agriculture.

cess; five or six hundred are there not uncommon. Lord Chief Baron Foster, in Ireland, went as far as to three hundred barrels, on a moory waste; and found the greater the quantity the greater the improvement. Dr. Anderson tried from one hundred to seven hundred bushels per acre, and found the good effect to increase regularly with the quantity. In more common cases, the quantities vary in general practice from thirty-six to one hundred and sixty bushels.

§. 7.—*Soil.*

Upon peat bogs and peat moors and mountains, the subject is discussed as soon as named Experiments on every scale, and under a very great variety of circumstances, speak an uniform language: the benefit of applying lime is great and decided. On these it operates by means of all its most essential qualities.—Its causticity destroys a great spontaneous growth, and converts it into a mucus, which the atmosphere turns into vegetable mould.—Upon liming Kedgley-moor in Northumberland covered with ling, the ling was killed; and three tons an acre of white clover were mown without sowing any.* The ling flourished in the sulphuric acid, which preserved the seeds of vegetables embedded in an antiseptic mass; but this (when neutralized into gypsum) assisted putrefaction,† and prepared the destroyed vegetables to give nourishment to the dormant seeds.

Next to peat soils, other wastes that are in a state of nature, are those on which time has the greatest effect. Part of Meridan-heath was fallowed for a year, and ten acres trebly folded with one thousand sheep, ten acres well dressed with good rotten dung, and ten acres well limed; and all sown with oats and seeds. The part folded had not a bag of oats an acre, and the seeds not worth saving: that which was dunged succeeded very little better: that which was limed produced a most excellent crop of oats and seeds.‡

On many soils, the circumstance of being full of unconsumed vegetable particles is alone sufficient to ensure great benefit from lime.—"In Glendale-ward, Northumberland, the soil is naturally dry, duffy, light, full of fibrous roots, and, when in fallow, on passing over it you sink to the ancles. After being sufficiently limed, the fibrous roots disappear, the soil becomes denser, firm to tread, retentive of moisture, and produces better and more abundant crops of grain: laid to grass, white clover appears to an inch where lime was spread."§—And in another case, in the same count, the soil light, dry, and *chanelly*, but *clear from broom*, the effect was equally great. In such instances, to destroy the roots is to consolidate the land. Even on a burning sand, four chaldrons per acre have had a striking effect, but it was covered with a mossy sward.‖ On other soils accounts are various, but many are reconcilable to each other; and probably all would be so, if every circumstance had been reported. It does "worst of all on a cold hungry clay."* On strong, deep clay, extremely retentive of moisture, no perceptible good was produced in eight years†; but on the "rich, loose, friable," puffy clays of Aberdeenshire, the want of lime is the want of wheat.‡ It is obvious to every reader how such accounts harmonize. There would be little use in quoting the many cases in which lime has failed. It cannot succeed where it has nothing to *work upon*, in the farmer's language; it cannot succeed where water deprives it of its most material properties; it cannot succeed where frequent repetitions have given a full dose, perhaps too much of calcareous earth, and consumed every vegetable particle. Proper liming we have just found to consolidate a loose soil; "too much renders it soft and fuzzy, so that wheat looses at its root."§ In such cases the author's advice is to roll well after a frost.

I applied lime in various quantities with the ashes of a deep paring and burning. The crops were great, but not the smallest benefit from the lime. No wonder; the fire had converted the vegetable particles to ashes, that is, to carbon, alkaline and other salts, and calcined earth.

Much might be added to this chapter, on the repetition of limeing, which, in Yorkshire,‖ Wiltshire,¶ Sussex, &c. has been found useless or pernicious; and also on the courses of crops after such manures. But brevity is necessary in a memoir, which of course embraces so many subjects.

Lime Stone.

Not to multiply chapters and sections needlessly, I shall here add, that powdered lime-stone has been tried, and found to have excellent effect on such soils, as other calcareous manures operate on successfully. Lord Kaimes says, that it is an excellent manure. Du Hamel found it so in France. Dr. Anderson calls it "most beneficial;" and says, that he has seen the model of a mill for pounding it.—In North-America a red crumbling lime-stone is found to be an excellent manure;** and pulverized stone had there great effects.†† The rotten lime-stone of the county of Cork‡‡ is probably of the same nature as that of America The immense benefit of lime-stone gravel in Ireland is known to every body: it has been used with great success in Aberdeenshire.§§ I am in doubt whether it is not the best of all manures for improving a bog, its great weight giving the pressure so much wanted on peat-moss.

* Sir Digby Legard.

† Mr. Kirwan expressly says, that gypsum has a septic quality; but I am aware of Mr. Davy's experiments to the contrary. As the fact depends entirely on the quantity used, I conceive that repeated trials are necessary to determine the question. A *little* salt assists putrefaction, *much* resists it.

‡ Warwick Report. § Northumberland Report.
‖ Marshall's York.

* Blithe. † Wight. ‡ Report. § Jenkinson.
‖ Young. ¶ Davis. ** Kalm. †† Livingstone.
‡‡ Young. §§ Statistical Account of Scotland.

(To be continued.)

REMARKS ON

The Cultivation of Tobacco.

We have translated a chapter on making Tobacco Beds into this number of our work, from a French book, entitled "A Complete Treatise on the Culture, Manufacture and sale of Tobacco," published at Paris in the 1791, by "An Old Planter"; and we commend many of the suggestions of this writer to the favourable regard of Tobacco planters generally, but particularly to those of this state, whose tobacco, if they would obtain a superior price, must be made of a bright color; and we have always thought it necessary to plant early, even on new land, if they would make a great proportion of the crop bright or yellow.

Corn planted upon stubble ground, they say, will not be injured by the cut-worm; nor will it even upon fallow ground, if every time you give a preparatory working to the land you scatter corn broadcast, harrow it in, and let your hogs root for it and the worms Now, if by such means tobacco grounds can also be freed from these pests, we can perceive no reason why the tobacco made in this state may not be very generally and much improved in its quality, and of consequence in its price.

For, by raising an abundance of plants, fit to be transplanted from the 10th to the 30th of May, which they can easily and certainly do, by pursuing the following directions; they will be enabled to pitch their whole crops, be they large or small, before the month of June; until when they need not wait for rains to give them planting seasons, but may safely set out their plants in newly stirred earth, which at this period of the year is moist enough to sustain them. Tobacco thus early planted will ripen in August, and being perfectly ripe, will cure well; much better during such warm weather, than it could by any possible process at the close of September and beginning of the frosty month of October.

An additional advantage which attends early planting is the greater safety of your crop, as its leaves escape the depredations of the late swarm or second glut of worms: the plants getting ripe and being housed before the worms appear.

The use of hot-beds was recommended to the tobacco planters of Maryland, some time in the year 1819, by Thos. Law, Esq. Vice-President of the Prince George's Agric. Society Md—and we were informed, towards the close of the same year, that a scientific agriculturist on Elk Ridge, Ann-Arundle co. Md had actually and beneficially relied upon them for a part of his tobacco plants. About this time we procured the abovementioned "French Treatise," and by adverting to its suggestions, and the fact just mentioned, we prevailed upon some gentlemen early in the year 1821 to try the experiment of raising a part of their plants upon hot-beds, roughly constructed in the fields, and they succeeded so well, that they intend this year to enlarge them sufficiently to raise plants enough to pitch their entire crops. To conclude, we advise every tobacco planter gradually to arrive at the same ends, by similar means; that the quality of their crops may be much improved, and their extent be more correctly foreseen. Let no one who reads this paper hereafter complain, that he has lost his plants, and therefore cannot pitch his crop—unless he has first pursued the recommendations now given; and we persuade ourselves to hope, that no one will ever have occasion to utter such a complaint who shall have faithfully pursued the chief directions of the French writer, as quoted below on this subject.

We last year saw tobacco more successfully cultivated in Baltimore county on drills than in hills, by the same planter; and, he intends this year to make his drills closer on old land, and set his plants nearer together, hoping thereby to improve the texture of the leaves, making them silky and thiner.

Editor Am. Farmer.

Translated from the French.

CHAP. XIII.

On Tobacco in the Beds.

Tobacco remains in the beds about six weeks, the seed is sown about the 15th of March, and the plants are set out in the field during the month of May.

Sec. 1st. Of Beds in General.

The Hungarian peasantry always make their Tobacco beds against the south ends of their houses.* These beds are enclosed by hurdles 2 feet high, at the bottom of which stones are laid, and on the outside of these, thorns are thickly placed, to exclude the moles; they fill this enclosure to the height of 1r inches with fresh, coarse manure, which they press closely by beating as they throw it on; and they co ver this with finely pulverised earth, mixed with dung of the preceding year that had become soil: this second course or layer ought to be 8 or 10 inches thick. They do not regulate their time of sowing either by the moon, month, or the season, but by the holy week of the passing year; it is on *Good Friday*, that all of their beds are sown, and although this day may vary nearly one month in different years, they are faithful to their thermometer—their piety not permitting them to know any other. To the mysterious influence of this day, without regard to the season, they ascribe their success, and they generally succeed.

To protect their beds from the frost they strew on them thorns, or brush; dead leaves: rags; or stubble—and the most prudent cover them with mats which are spread about six inches above the bed on cross pieces, that are supported by upright sticks driven into the bed, and forked at the top. The mats are made of straw, or of reeds in which the country abounds. They guard incessantly against the frost; but their houses all being roofed with straw they do not make any use of smoke, although it is the most simple and efficacious resource.

The proprietors make their beds in cases or pens which they have constructed on the spot, by means of stakes driven closely into the earth, and methodically arranged; the bottom protected as perfectly as the sides—so much do they fear the ravages of moles. The richer planters have their beds formed in cases of stone or brick masonry, covered with glazed sashes, which have to be repaired and renewed more frequently than the other parts; but these beds cost less to support or attend them, and the heat is best preserved in them. The dung is placed in these in the manner pursued by the peasants when making theirs; but the soil on the top is lighter and better, because it is passed through a finer sieve and at the same time mixed with tan, which forms the best of all composts, as it the most readily permits the roots to extend themselves. The sashes which protect these beds are sometimes glazed, but most frequently they are covered with paper, that has been twice varnished; others finish the sashes with paper which they have steeped in linseed oil, or which they have greased with mutton tallow over a chaffing-dish containing a little fire; and finally there are some who, omitting these details which have to be repaired in part or whole every year, shelter their beds with tilts or covers supported above them on triangular frames, formed of a ridge pole resting at each end on a pair of rafters, which are fixed on the plates; this forms a roof that will shed the rain, it may be spread or taken off at their pleasure, and is never in their way; when no longer useful they wash their tilts and put them by for the next year. The last mentioned beds should be insulated; that we may, according to the weather, spread or withdraw the tilts which are always fastened at bottom, and care should be taken that the wind during storms may not raise or carry them away.

We will now give you a receipt for the size, and the varnish which should be put on the paper that it may resist the rains.

Recipe for the SIZE or PASTE.

Glue ½ oz, Wheat flour 1 pint, Water a sufficient quantity. First dissolve the glue in hot water, then gradually add it to the flour, and then boil them to a proper consistency.

Recipe for the VARNISH for the first coat.

Litharge 1 oz, Minium ½ oz, Linseed Oil ½ pint, Bees-Wax ½ oz, Rosin 4 oz:

First pound the litharge and minium until they are very fine, then boil them with the linseed oil half an hour, on some coals; next add the wax and afterwards the rosin, and when these ingredients have dissolved in the mixture, permit it to cool for use.

VARNISH for the second coat.

Litharge ½ oz. Linseed Oil 1 gill. Minium ¼ oz. Bees Wax ¼ oz, Rosin 3 ozs.

This varnish is prepared and used preciseiy as the first—they are spread with a brush similar to that used for white-washing, and the first coat must be perfectly dry before the second is laid on.

The best way to secure the beds, it appears to us, is with tilts; for the care to be taken of the plants in the bed is but an affair of six weeks; and these coverings do not prevent the use of straw mats as employed by the Hungarian peasants; the tilt in such cases serves only as an upper and outside cover: but this mode is infinitely preferable to any other, because it permits a free circulation of air beneath the cover which causes the plants to grow more rapidly and become more hardy, than under sashes finished with glass or varnished paper, which are often injured by awkward persons and are not easily repaired.

There is a third kind of bed, not less productive than the two preceding, and preferable to them; because instead of diminishing the quantity of manure on the plantation it encreases this, and without causing any extraordinary labor, hauling or expense; for this purpose, procure good soil, pass it through a sieve, mix it with compost made the year before, and spread them to the height of one foot, upon the dung-hill in the lower or barn yard previously made ready to receive it; then surround it with thorns or brush, leaving only a gate way to enter at—near to this there always is a pool or the well: this bed is sown and taken care of precisely as the other hot-beds; it is safe from vermin; and nothing need prevent its being covered with straw mats, under tilts; in such beds the plants enjoy a current of air less subject to frost than they could elsewhere; besides, they arrive at maturity in these, eight days earlier, and being near to the house they are better attended to. It is to be regretted that such beds can rarely be formed but upon large farms, where manure is abundantly made; for, their first intention being accomplished, they are broken up and enlarge the manure-heap.

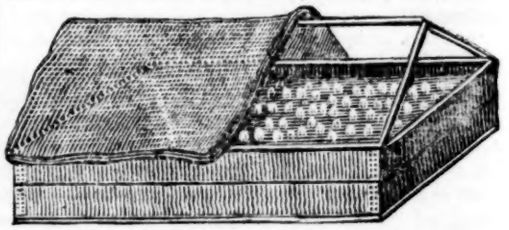
DIMENSIONS OF THE BEDS.

The size of the beds must be determined by the quantity of ground intended to be planted. Upon a small farm, where seven acres are annually put in tobacco, worked ordinarily by three persons, half an acre may be planted per day; on this surface nearly 2,500 plants may grow, and be 3 feet apart each way; to this number we should add enough for replanting as some always will—and many may perish; and we think it best to provide three times as many in the beds as you intend to raise in the fields, so that in case all of your two first plantings are cut off by frost or vermin, you may still have plants for a third; provide, therefore, on your beds 15,000 plants for each acre that you intend to cultivate in tobacco.

Each plant ought to be allowed a square inch on the surface of your beds, that they may grow readily—at this rate, the surface of your beds should measure nearly 105 feet, of 144 square inches, multiplied by the number of acres which are to be planted—so that the dimensions, and I think the best form also of a bed; upon which to rest a threefold hope, as it gives as many chances of securing a crop of tobacco from an acre of ground; are 35 in length by 3 feet wide: but whatever may be the length or number of your beds, let them in all cases be insulated; and we advise you to make them only 3 feet wide, *that even children* placed at each side may first weed, then thin, and afterwards draw the plants without doing any injury.

If you expect to plant your crop of tobacco at ten or fourteen days or times, you should divide the surface of your beds into as many sections, by some permanent mark; because, as you will plant your fields on ten or fourteen different days, so you should sow a rateable part of your beds on the like number of days. The beds should be at least eighteen inches high, but never more than two feet: they should be enclosed by a fence at the distance, on all sides, of about five feet; be placed in the most sheltered situation, and as near as possible to your dwelling.

Here is the form of a tobacco bed in its casing, without sashes, but partly covered by a tilt, which we think preferable to the use of sashes either glazed or finished with varnished paper.



SOWING THE BEDS.

SECTION III.

Each country, and even each district has its method of sowing; some persons mix ashes with the seed, others add sand; and in some places they use compost or tan; snuff, bones ground to dust, or salt pounded very fine; each one believes that his own plan is the best, and adopts it with a hope of destroying the fly or flea, which make their appearance with the young plants; and likewise for the purpose of enabling him so to spread the seed as that the plants shall not be too much crowded.

The quantity of these foreign matters thus mixed with the seed are equally different; some add six times the quantity of the seed, others nine, ten, twelve, &c. but for this there is no rule, however the following directions may be safely pursued.

The bed being well made and well watered the day before, the soil on which you are to sow being nine or even tweleve inches deep; the surface is made smooth by slightly passing a board across and on every part of it—in performing this operation there should be a person on each side of the bed; then scatter ashes through a sieve over the whole surface until it becomes of a grey color, then smooth this coat by again lightly pressing the board across the bed; finally, when sowing you will use two boards twelve inches broad and as long as your bed is wide; commence at either end, lay one board on, 12 inches from this end, so as to leave a space one foot wide between them uncovered; the seed being in a parchment sieve with but few holes in it, and these so small that only one seed can pass through at a time, you will shake the sieve over this narrow space, and as the brown color of the seed enables you to distinguish it on the ashes, you can easily regulate the quantity according to your wishes, and sow more on places which require it. This first part of the section finished, the board is raised, and laid down on the part just sown; the second board is then placed one foot from the first, and the intermediate space is sown; the first board is again raised and placed a foot from the second; and you will thus continue to sow as many spaces as there are feet in the length of your beds. You might make fewer spaces by placing the boards farther apart; but in such cases we have always observed that they are not so regularly sown, and that the little extra time bestowed by sowing on smaller spaces is amply compensated by a greater deliberation in sowing, which more readily allows you to perceive when there is enough seed, or where more is wanting.

Care of the Plants in the Beds.

The sowing finished, the seed should be covered with virgin earth or compost, mixed with tan if you have it, else with dry and pulverised horse dung: this coat should not be more than six lines thick; the plants will rise the sooner through it, which is a benefit. and besides, after they have appeared you can lay on another coat, which will invigorate them surprizingly, and you may repeat this whenever they appear to grow too high or spindling.

These successive coats or coverings should always be applied through a sieve, and when they are finished, fail not to water the bed well; the best irrigation would be a rain, but in the absence of this, we should imitate it by putting a nosle on the watering pot with but few and very small holes in it, and holding this when we water the beds as close as possible to the plants.

Attentive cultivators cross the beds at every two feet of its length with packthread, to serve them as boundaries, watering regularly from one thread to the next, and it is very certain that they are well rewarded for this little care by the beautiful condition of their beds.

If the fly appears with the rising plants, a new coat of compost, in which you have mixed some salt reduced to an impalpable powder, will kill or overpower them*; this is an advantage which those persons cannot enjoy who put several inches of earth on the seed at the time of sowing, and through which they rise with much greater difficulty.

Your plants will scarcely have appeared before the bed will be covered with weeds, but let them grow until they can be readily distinguished from the tobacco plants, make your children familiar with the appearance of these, and then by little rewards teach them to rid the beds of weeds—their little hands can pick them out better than we could, and when they once understand it, the beds will be more exactly weeded, if we overlook and encourage them.

Next teach them to distinguish the best plants, to observe where they are too closely sown, and to thin them by always removing the most indifferent, until each of those which remain on the bed shall only have a surface of about one square inch to grow upon; little girls are peculiarly handy at this employment.

That children may be employed for these purposes, you should be careful not to make your beds higher than two feet, nor wider than three.

And the hotter the dung laid at the bottom of your beds, the thicker you should make the covering of earth on which to sow your seed; sheep manure is said to be the best and hottest, horse litter the next and last of all, that of Cows.

The seeding being once finished the beds should be watered every day; that the plants may have time to rise slowly and become strong; if they are too much forced by heat they will grow up spindling; if regularly watered they will have better roots, and may be left a week longer on the beds; for this delay they will amply repay you, when they are transplanted.

Your subsequent attentions will be turned to keeping the enclosures of your beds shut, so that no person shall enter them unless to work there; never use any other than rain or river water, unless you have none but that of a well, in which case draw this a day before you use it; every evening cover the beds with straw matts raised but a few inches, and envelope the whole with tilts; you should carefully exclude the cats, for they delight to lay upon the tender plants and warm surface of the beds. You ought to have rendered it impossible for the moles to enter, by having made the casing of the beds every where perfect; you should take care that the children do not waste or pilfer your plants.

You will make war upon the fly and other insects by the means before mentioned; and never hasten the growth of your plants by any extraordinary means; the open air, light and sunshine should be allowed them whenever the weather will permit; always covering them again before sunset; and you should now lose no time in preparing your grounds, finishing your trenches after filling them with rubbish, *you will mark even the places which are to receive the plants; but in this case the holes are to be made with a large dibble that they may be filled with compost and the plants be inserted, using a smaller dibble.* Six weeks give time enough, in which to make all of these preparations, and the plants ordinarily remain that long in the beds; finally, about the tenth day of May, they ought to be nearly two inches high, have five or six leaves each, forming a round top, their roots straight and strong; the whole plant well formed, will be six inches long, including the roots, these should be free from knots and have acquired a good length. When your plants are in this state, it is better to plant early than late, nor should you ever forget that the plants set out in the month of May are always best furnished with leaves, and that nothing can compensate a planter for the loss of this precious month, *the month of May.*

* 40 bushels of salt weighing 56lbs. each, or together 2240lbs; if strewed over an acre of ground, or 4840 square yards, would destroy the vegetation thereon; but 20 bushels weighing 1120lbs have been advantageously sown upon an acre of wheat;" see Essay on Salt as a Manure, page 76, published for C. W. Johnson, London, 1820. From these assertions we may conclude that if the several applications of salt on the surface of the tobacco-beds, do not in one season or year exceed one-fourth of a pound to the square yard, the salt will do no injury to the plants.

Ed. Am. Far.

FOR THE AMERICAN FARMER.

EARTH BURNING.

Remarks on Mr. Aiton's attack on Earth Burning, &c.

To J. S. SKINNER, Esq.

Sir,—

It is with no small degree of astonishment, as well as regret, that I have read in your 3d volume, No 47, the above mentioned piece. I cannot consent to pass it over in silence; and, although my abilities are small, and my experience too much on the *two blanket scale*, yet I have the presumption to think them quite sufficient for a complete refutation of Mr. Aiton's *notions* This gentleman, by his style and manner of handling the subject, (plausible to a superficial view) will certainly shake the faith of some, especially those who are about entering on the labour of preparing burned earth, and more certainly if they are destitute of chemical knowledge. I will give Mr. Aiton due credit for his introduction, and for all his remarks on Florin-Grass, and also for all his assertions as to plain matters of fact observed by him, i. e. as to the decline of the preparations of clay as a manure. I will also credit him with his remarks as to Mr. Wallace's bad choice, and Mr. Nasmith's credulity: but, after these liberal allowances, I must say, there is scarcely one physical truth to be found in all the residue of his paper—a total ignorance is betrayed of matters of fact, as well as theory. Mr. Aiton can neither be a chemist, nor an agriculturist; he may walk in the tramels of his predecessors, or follow the example which a neighbor may set—but it is clearly to be seen, that he is destitute of real knowledge on these points; and that he is better fitted when left alone, to bring the agricultural world to a chaos, than to make it a Paradise. These assertions of mine, I think I can prove to the satisfaction of my learned readers, or practical fellow farmers—The first assertion of Mr. A's. is certainly a random one—as to burned clay *never* covering again unless acids are added: who has tried either experiment? has Mr A. been able to examine burned earth even after it has been ploughed in for three years? how could he find it after a few good ploughings? What sour crop did he turn in to try to make it cohere?—was it Rumex-Aceteocella (sour dock,) or Oxalis, (sheep sorrel)? I ask my reader plainly if this does not bear the stamp of round conjecture—and if this is the beginning of arguments to overset solid facts, what may the end be? Why did he not state his experiments like a philosopher? We need not be indebted to Mr A. to tell us when it loses its fertility The crop will proclaim this too plainly to be misunderstood, and that in a short time comparatively—but by Mr. A's. theory, it can never give out, for it will always be a dividing substance, till we are fools enough to plough in acids: Risum Teneatis? And this grand argument, after all, is rather Mr. against, than Gr. to his object.

Mr. Aiton now sets up his own theory of the fertility of burned earth, (for he allows some,) and what is it? One of the most repugnant to matter of fact that can be conceived. It reads very prettily on paper—but, let a man carry even one hundred 2 horse loads of sand, and plough it into an acre of stiff clay soil, and then carry a little of it, thus mixed, home with him, say a cubic foot, and examine the mixture; this will put his mixture theory all out of his head, without any farther observations—for a natural mixture, to be perceptible, will not be less than 500 loads to an acre to destroy the tenacity of clay, which quantity no man in his senses would try to imitate. Unfortunately for Mr. A's. theory, burned earth acts best as a top dressing when grass is raised—then no mixture is made; simple scattering from the cart—at least this was my method, and good Timothy was produced, where it could not grow without aid. If I am deceived, my horses are also deceived—they are fat and strong to appearance, by feeding on it; and if so, let us with Horace's man, be allowed to enjoy our happiness: do not break in upon our delerium, for we have no sand in our neighbourhood to substitute—and I really fear that this article would, if applied, (provided it be not saline sea sand) awaken us to our senses!!

In the next observation, Mr. A. seems willing to allow burned earth something more than mere mechanical action; "some soot, some carbonic matter from the burned vegetable remains contained in the soil" This soot however cannot be found; for the fire is too intense to suffer any thing volatile to rest in the kiln—that the vegetable matter is carbonated is allowed, and of course destroyed; for carbon, tho' very capable of *dividing* the soil, is inimical to vegetation—a seed will not germinate in it.—(See Humbolt's experiments on this.) I think Mr. A. very unhappy in assigning his small vegetating powers to these two articles, one he cannot shew, and the other is incapable. He also attributes stimulating qualities to them; thus assuming the principle of sensibility and contraction, of the wooden vessels as in the animal circulation: a doctrine on which both Wethering and Darwin have laboured in vain. But if these articles do stimulate, why not stimulate like arsenic? Who can measure their powers? A mere guess of—"*very little*" is a poor measure in philosophy! The degree can neither be seen, felt, nor measured—such undetermined stimuli are neither desirable nor terrific; perhaps they stimulate the imagination. Mr. A. after taking leave of the clay, and his mechanical doctrine, proceeds to examine the lime that may be in the soil, chemically,—the sand he leaves to its fate, though so much is always to be found, even in clayey soils. He denies that lime, though even in grit, will be deprived of its carbonic acid The author of this paper has burned shells and earth together, till they were deprived of their tenacity and become sufficient for agriculture—and from his trial with limestone, he has no doubt of lime in grit being calcined sufficiently for agricultural benefit. Why did Mr. Aiton not try his mechanical doctrine on lime grit? Or does the burning of it make either soot or carbon? And yet the burning increases its *stimulus*, as he calls it, fifty for one—but does not cause it to divide clay any better. Our author is here fairly aground—two or three theories run out, and yet the soil not theoretically examined. As he has been so unhappy, I will tender him my ideas; and first—Of Lime.—This, when any in the mass is calcined and rendered active, producing a fertile soil, in proportion to its increased solubility and decomposition by combustion; as it is a known fact, and admitted even by him, that burned lime stone is more fertilizing than when unburned, it would be needless to theorise on established facts. All I assert is, that most ground contains some lime, and by burning it with the earth it is brough into action. As lime is found mixed with clay, so is *sand* in much greater proportion, and more generally. This article I conceive receives great benefit from the action of fire—for there are few places where sand is pure as we may find by trying to make glass of it, a mere rude mass is produced, because, though so small individually, it is as liable to be a compound as a rock, always having plenty of iron to give it color—the other components,

whether made up of sand-stone, horn-blend, or what not, all cohere so as to make it unfit for vegetation, whilst a decomposition by fire or even long exposure has a contrary effect; for the nearer the elementary state is approached, the more suitable for the vegetable economy—and that for the plainest reason, because all attractions or cementations among themselves being removed, the vegetable attraction commands more readily the wanted supplies from them: indeed, every grain of sand should be considered as compound rock in miniature, and this will give an idea of the effect of roasting or decompounding it to the slenderest capacity. This law is observed in the first state of germination by the seed, the albumen of the seed being first decomposed by heat and moisture, the young plantule extracts from it the wanted elements more particularly oxygen—and I believe it a fixed law in the vegetable economy, that the *decomposition* of all bodies, mineral, vegetable, or animal, are favorable to their growth—while, on the other hand, all cementation is unfavorable; and hence we conclude, that soil to be most productive which undergoes, either by artificial aid or natural contents, a slow decomposition of its components. Almost all known manures favor this, and all might be divided into *fermentatives*, *fluxes*, and *pabulums*—the first comprising all vegetable and animal manure—the second, all minerals acting on other minerals or earths—and the third, the salines and oxydes that have been formed by decomposition, some articles claiming a place under two classes.—But I am straying from the subject. I will now touch on an article which chemists have not ranked among the components of soil—the oxydes of iron, though they are nearly universal. It is worthy of remark that such soil as is colorless is incapable of vegetation; hence it must be an article of great value in the compound. By combustion the carbonites of iron are oxydated, and become a fine part of the productive soil—and some persons think that gypsum gives this change; for in every soil where gypsum is active, a change of color is produced—an unequivocal testimony of a change in the oxydes of iron; every paint-maker knows the effect of fire in preparing ocres and Spanish brown—magnesia I pass over, it being rare, and its changes not being well known: whether calcined or not, it is more or less favorable to vegetation; however, it is considered, when in any quantity, unfavourable. I come now to the grand article, namely, Clay: this is seldom pure, as may be known by its not forming allum readily with the vitriolic acid; it is nearly always coloured with the oxydes of iron, and sometimes with the sulphuretts. Respecting its torefaction I know very little experimentally, having always prefered combustion; but I am surprised to hear a gentleman of science say he does not understand the distinction! A cook can tell such a man, that the pig is roasted, but the wood is burned. Inflammables surely may be roasted. E. g. a cubic foot of wood will require at least another cubic foot of fire to bring it to a charcoal, but one single spark of fire is sufficient to render one thousand cords of wood into ashes—two very different things, and of extreme different qualities on vegetation: this may shew the most illiterate the difference, though I do not consider the effect on clay so different it is more in degree than quality. That clay undergoes combustion when properly managed is indubitable—for all the portion containing the first inflammable articles used for kindling may be removed, and still the fire be extended to the size of the Andes, if materials were present. If it undergoes combustion, it is certainly oxygenated, which I conceive to be a very material operation, and probably it may be afterwards capable of a farther absorption of oxygen—(See Humbolt on absorption of oxygen, by (humus) soil.) Now if Thomson's experiments be true, that no seeds will germinate without this pabulum, viz—oxygen, of course,—whatever carries it into the soil, or attracts it there, must be highly favorable—provided nevertheless (as lawyers' say) it does not hold it so fast, that vegetable roots cannot command it. Bodies readily corrupting must part readily with their oxygen, tho' certain minerals might not. The vegetable matter in soil being injured by combustion, I will only remark that it shews the great benefit that the clay, the sand, the lime, and the oxydes of iron have received by combustion. I have already said, that I have produced good grass from burnt earth, on one or two acres. I must now add, that I consider its strength only as one-fourth of wood ashes, requiring seventy-five loads per acre, and in this labor of carting, burning, and scattering a due quantity lays the secret of a declention of the smoking kilns in Europe.

P. S. I recommend those persons who pretend that it is the vegetable matter in the earth that maintains the combustion, to go at least to some burning kilns, and some forming kilns, and examine that point minutely, and not trust to a thought in their closets; which may do for poetry, but not for farming,

S. V. S.

BY REQUEST.

Delegates from Agricultural Societies.

From the (S. C.) Southern Patriot.

MR. EDITOR,

One of the principal advantages obtained by the formation of Agricultural Societies, in various parts of the State, appears to be the interchange of opinions among practical farmers, collected from the different parts their districts. These benefits would be greatly increased if a Society was established, composed of delegates from the different societies now in our state. From an association of this kind, every prospect of decided advantages to the improvement of our system of Agriculture throughout the State, can confidently be expected; from the certainty that this society will consist of the most zealous, and intelligent practical men, from each district. Thus composed, we must conclude that great exertions will be made to excite and keep up that spirit of enquiry and emulation, so essentially necessary to produce improvements in every branch of the art of agriculture; and we would have communicated to all parts of the State, the results of the many experiments and interesting occurrences, which annually merit the notice of the observant planter. The State of Virginia, and others, have already established with prospects of much utility, the plan I now with deference submit to the attention of my brother farmers; and especially the members of those societies now in operation in our State. Without trespassing too much upon your paper, I merely add that after some attention to the proper place for the location of this association, the city of Charleston appears to have every advantage which can be required, without those objections which must apply to its location in any other city; and during the Charleston races would seem a suitable time for this meeting. I perceive with much pleasure, that the society of your city have renewed their exertions to promote the objects of their association; and I should hope to be successful in my attempt to form one constituted as I have briefly noticed, if this society so long established in our State, should view favorably and take a leading step to produce its formation. It is with satisfaction I add, that within the last two years, the attention of our planters and farmers are much more alive to the utility of such meetings than hitherto; and, unless I deceive myself, the present time appears to be favorable for the organization of such an *association*, as I have feebly attempted to recommend to the agriculturists of South Carolina. From the favorable notice you expressed relative to one of the subjects to which I ventured to call the attention of our agricultural brethren, could I flatter myself that this would attract your notice, I should then expect to see it handled in the same manner, with which the readers of the Patriot are presented with its views, upon political and domestic policy. As the projects of most men, not only in Medicine, Agriculture, and the various Mechanical arts, are too often appreciated by the standing in society of the projector, I trust the utility of the scheme proposed to advance the state of our Agriculture, will be judged by its intrinsic value, and not because it originates from a private citizen who has never attempted to leave that station. The prompt and satisfactory manner with which your correspondent, "A South Carolinian," answered my enquiries, in regard to the culture of hemp, merits my acknowledgements, and is an evidence of that feeling so happily existing among those engaged in that most important occupation, the tillage of the earth.

The Editors of the newspapers in our state are solicited to give these remarks an insertion in their respective Journals, and oblige their fellow-citizen.

A COTTON PLANTER.

To the Editor of the London Courier.

SIR—I send you the following table, containing the yearly average prices of grain, in England and Wales, for the last seven years, ending Oct. 27, 1821, and also for the week succeed ng that date, which I trust will be considered interesting to your numerous agricultural readers, and useful to the landlords of tillage farms, as a scale by which to calculate the reduction of the rents of their tenants.

I have carefully calculated this table from the weekly returns published in the Gazette, and I believe it will be found generally correct. Your's,

AGRICOLA.

Nov. 14, 1821.

Week ending Nov. 2, 1821.		Year ending,	Wheat		Rye.		Barley		Oats.		Beans.		Pease.	
			s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
55	1	Oct. 28, 1815.	66	6	39	0½	31	6	24	5½	37	9½	40	8
		Oct. 26, 1816.	72	4	40	11	32	3	23	3	36	3	36	6
		Oct. 25, 1817.	97	6	58	9	49	0	32	8	53	2	51	9
		Oct. 24, 1818.	84	13	52	8	50	9	31	8	59	14	55	11
		Oct. 30, 1819.	75	0	52	7	51	7	31	2	60	4	60	4
		Oct. 28, 1820.	67	3	41	10½	35	3	24	9½	44	10½	46	5
		Oct. 27, 1821.	55	1	32	11	25	11	19	3	32	1	33	8
24	4													
26	7													
20	1													
28	1													
31	10													

RECIPES.

For Indigestion, Weak Stomach, Head-Ache. &c.

One tea spoonful salt Tart. 1 table spoonful Cream. Tart. ground together—a tea spoonful of this mixture in a wine glass of water for a dose—repeat the dose till you are relieved.

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The efficacy of *Cotton* in cases of *burns* has been well attested. In attacks of Gout and Rheumatism Cotton carded and laid upon the part effected has likewise been found to afford a relief which could be obtained from no other application.

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